

EVOLVING WET WEATHER AND WATER QUALITY STANDARDS ISSUES FOR CSO COMMUNITIES

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ABSTRACT

The Combined Sewer Overflow (CSO) Control Policy contains provisions for developing appropriate, site-specific NPDES requirements for all CSOs. The expectation of the CSO Policy was that long-term control plans (LTCPs) would be developed to meet water quality standards (WQS) and, where appropriate, States would revise their WQS to reflect the difficulty in achieving compliance with current bacterial standards in urban areas during wet weather events. However, WQS and designated use reviews have been or are being undertaken for only a few of the more than 900 communities with CSOs in the United States although in most cases LTCP implementation will not result in compliance with existing water quality standards. Furthermore, EPA will require all states to adopt new bacterial standards by 2003 as research indicates that current bacterial standards are not adequately protective of human health. The new standards were not anticipated by the CSO Policy, and therefore are not addressed by most existing LTCPs although LTCP implementation is a phased process often spanning 15 or more years.

This paper discusses the difficulties CSO communities face in obtaining revisions to WQS to support the development of LTCPs that are cost-effective and protective of water quality and human health. The few approaches to revising WQS for CSO receiving waters that have been adopted by States are presented. A summary of the new EPA-recommended bacteria criteria for fresh and marine waters is provided, as well as the bacteria criteria for those States with CSOs that have moved to implement the EPA's new bacteria criteria. Finally, we present actions that CSO communities can consider taking to ensure they obtain the flexibility in their LTCP that was envisioned when the national CSO Policy was adopted in 1994.

KEYWORDS

CSOs, Water Quality Standards, Long-Term Control Plans

INTRODUCTION

In 1994, EPA issued the Combined Sewer Overflow Control Policy, which contains provisions for developing appropriate, site-specific NPDES requirements for all CSOs. Compliance most

often takes the form of a long-term control plan, which outlines the selection and implementation of CSO control alternatives. The expectation of the CSO Policy was that LTCPs would be developed to meet water quality standards (WQS) and, where appropriate, States would revise their WQS to reflect the difficulty in achieving compliance with current bacterial standards in urban areas during wet weather conditions. However, to date, WQS and designated use reviews have been or are being addressed for only a few out of the more than 900 communities with CSOs in the United States. Reasons cited include:

- Lack of political will to tackle the appearance of relaxing water quality standards;
- Scientific and political complexity of the water quality standards and designated use review processes;
- Poor coordination, cooperation, and consistency when interpreting whether WQS are met;
- Need for a watershed approach and conflicting priorities (total maximum daily loads, CSO, storm water, and sanitary sewer overflows);
- Lack of resources at all levels of government; and,
- Uncertainty of roles (who is responsible and accountable during the LTCP and WQS and designated use review process).

Recognizing the difficulties that CSO communities have faced in obtaining WQS and designated use reviews prior to completing their LTCPs, Congress, in EPA's FY1999 appropriations, directed EPA to:

- Develop guidance to facilitate the conduct of water quality and designated use reviews for CSO receiving waters; and,
- Provide technical and financial assistance to States and EPA Regions to conduct these reviews.

In response to the Congressional directive, EPA held a series of stakeholder meetings with representatives from EPA Regional Offices, the States, CSO communities, and environmental interest groups during 1999. In May 2000, EPA released guidance outlining a process for water quality standards and designated use reviews for CSO receiving waters. The guidance suggests a system for integrating the long-term control planning process with the review of water quality standards. Although a significant first step, the implementation of the process outlined in the guidance document is ultimately voluntary. It is therefore unlikely that the release of the guidance document will force WQS and designated use reviews in the majority of CSO communities.

THE CHALLENGES OF OBTAINING WQS AND DESIGNATED USE REVIEWS

Current EPA regulations and guidance, based on the Clean Water Act (CWA) and CSO Policy, are structured to provide States some flexibility to adapt WQS to reflect site-specific conditions, including those related to CSOs. However, existing regulations provide that designated uses can only be removed if there is a reasonable basis for determining that current designated uses cannot

be attained after implementing the technology based controls required by the CWA. In determining whether a use is attainable, EPA guidance requires the State to conduct and submit a use attainability analysis (UAA). The UAA is a structured scientific assessment of the physical, chemical, biological, and chemical factors affecting the use of a water body. UAAs are both time- and capital-intensive. States agencies are often unable or unwilling to perform UAAs. EPA has recognized that CSO communities must be aggressive in seeking changes to existing WQS. Often, a community wishing to remove an existing use must develop and defend their own UAA. Typically only the largest municipalities have the wherewithal to work with the State to conduct a UAA.

Even for those municipalities able to complete a UAA, there are a number of both political and resource-related impediments to “backing-off” from perceived clean water goals. These include difficulties in achieving agreement between the permittee, permitting authority, WQS authority, and other stakeholders on appropriate revisions to the water quality standards. Typically the review and revision of water quality standards is also hampered by the limited availability of EPA and State agency staff to participate in the review process. Regulatory agencies have indicated concern that if water quality standard reviews are undertaken for a single CSO receiving water that the Agency will become inundated with requests from other CSO communities for similar action, overwhelming an already burdened system.

Another option available to CSO communities is lobbying the State to adopt a variance for the CSO receiving water. A variance is a temporary change (3 to 5 years, with renewals possible) to existing WQS. The criteria that must be met in order for a State to issue a variance include determinations that:

- The designated use is not an existing use; and,
- The designated use is not immediately attainable with implementation of the technology-based controls of the Clean Water Act and with reasonable, cost-effective best management practices to control non-point sources.

State agencies often prefer variances to WQS revisions because their temporary nature preserves the existing WQS. However, a variance is still a change to WQS and therefore requires substantial data be collected in support, an opportunity for public review and comment be provided, and that EPA approve or disapprove the variance.

UAA AND DESIGNATED USE REVIEW CASE STUDIES

Despite the aforementioned obstacles, several States have developed approaches for considering the applicability of existing water quality standards for CSO receiving waters. The State of Maine has passed legislation codifying standard procedures for providing variances for CSO-receiving waters during the implementation of an approved LTCP. Alternatively, the State of Massachusetts developed refined uses in order to address CSO-impacted waters. Short case studies of the actions taken by both States are presented below.

MAINE

The Maine Department of the Environment (DEP) has developed changes to Maine's water quality standards and designated uses to allow CSO communities to request temporary CSO subcategories. The site-specific CSO subcategories remove designated uses for short periods of time after wet weather events and snow melt in areas affected by CSOs. This allows communities to continue to make progress in solving their CSO problems while meeting State water quality standards.

Highlights of the law are as follows:

- CSO subcategories will allow for temporary removal of designated uses, not existing uses, that are impacted by CSOs. Each subcategory consists of an area and a time duration. CSO communities submit flow and load data to the DEP to assist in the determination of subcategory area and duration.
- Prior to applying for CSO subcategories, CSO communities must have submitted their LTCP and had it approved. The LTCP must place a high priority on abatement of CSOs that impact waters that have the greatest potential for public use or benefit, and must contain an implementation schedule for CSO abatement. The LTCP will be considered as the UAA.
- During, or following, development of the LTCP, the CSO community will conduct public hearings to gain input from stakeholders on the areas affected by the variance. If the variance is approved, the CSO community must provide public notice describing the limitations on use of the water body.
- Approval of a CSO subcategory does not relieve other dischargers from any requirement to provide necessary treatment to comply with water quality criteria.

The DEP periodically reviews all CSO subcategories. If the CSO community fails to comply with the implementation schedule in their approved LTCP, the subcategory may be revoked allowing DEP to take enforcement action.

MASSACHUSETTS

Massachusetts amended its water quality standards in 1996. The refined uses are the result of a UAA process, and using the CSO long-term control plan as the basis for selecting CSO controls. Refined uses modified some of the designated use categories and created subcategories for receiving waters with different numbers of CSO outfalls. One of the key components in assessing the appropriate category for a specific discharge was a use attainability analysis (UAA). UAAs were used in Massachusetts to evaluate attainability of designated uses and associated CSO impacts, specifically whether CSO controls would likely cause widespread social and economic impacts.

The surface water use categories in Massachusetts include:

- **Class B:** Water meets fishable and swimmable standards; CSO discharges are eliminated via sewer separation
- **Class B(CSO):** Infrequent CSO discharges remain. The LTCP justifies selection of CSO control alternatives as the most environmentally protective and cost-effective. Generally, the controls must meet standards 95% of the time (i.e. no more than 4 CSOs from no more than 4 locations per year). The UAA is a required component.
- **Class B(partial):** Similar to Class B (CSO). However, the receiving water is subject to more overflow events and more severe water quality impacts are expected. This category requires a legislative change to the existing municipal permit, and thus it is unlikely to be commonly applied.
- **Class C:** CSO discharges are allowed to remain; Only under extreme circumstances would a receiving water be given this designation.
- **Variances:** A variance is a short-term modification to standards to allow CSO discharges where the long-term attainment of standards is uncertain. To receive a variance, a municipality must conduct additional water quality assessments. A variance will be issued to a specific permittee and on an outfall-by-outfall basis for CSO discharges through their NPDES permit. The permittee must implement nine minimum controls and additional controls shown to be cost-effective as part of a LTCP. Variances are issued for shorter terms than a permit cycle, typically 18-24 months. After this time the standard reverts to Class B, unless a more appropriate water quality category has been determined prior to the expiration of the variance.

BACTERIA CRITERIA

EPA is expected to require all states to adopt new bacterial standards by 2003 as Agency research indicates that current bacterial standards do not adequately protect the public from pathogens. The new criteria are based on EPA's *Ambient Water Quality Criteria for Bacteria -- 1986*, which recommend using *E. coli* and enterococci as indicators for primary contact recreation. A summary of the EPA-recommended bacteria criteria is presented below in Table 1.

Table 1 - Summary of EPA-Recommended Bacteria Criteria

	Steady State, 30-day Geometric Mean Indicator Density (cfu/100mL)	Single Sample Maximum (cfu/100mL)			
		Designated Beach Area	Moderate Full Body Contact Recreation	Lightly Used Full Body Contact Recreation	Infrequently Used Full Body Contact Recreation
Freshwater					
enterococci	33	61	89	108	151
<i>E. coli</i>	126	235	298	406	576
Marine Water					
enterococci	35	104	124	276	500

In February 2000, EPA issued draft implementation guidance to address issues identified as impediments by States to adopting the new criteria. The guidance reaffirms the scientific validity of the criteria, provides recommendations about how States should transition to the new criteria, and makes recommendations about developing criteria for water bodies that are designated for non-primary contact uses. Issues of particular interest to CSO communities raised by the guidance include:

- Mixing zones are prohibited from impacting known primary contact recreation water bodies;
- Both fecal coliforms and *E. coli* and/or enterococci are to be included in WQS, for a limited period of time, to establish an adequate database for *E. coli* and/or enterococci;
- The need for discussions on the continued development of total maximum daily loads (TMDLs) if the need for a TMDL was based on fecal coliform, and the need to continue measuring progress against both fecal coliform and the new indicators;
- The geometric mean **and** the single sample maximum must be met for water bodies that fully support primary contact recreation. EPA notes that States should tailor the single sample maximum for site-specific conditions where water bodies are infrequently used, and that monitoring guidelines for these waters need to be developed;
- The development of guidance for application of water quality criteria for bacteria in high flows;
- Designated uses can include designation of intermittent, secondary, seasonal recreation, or no recreational use; and,
- Non-primary contact recreation uses may be applicable to waters that are irreversibly impacted by wet weather events.

EPA also notes that additional research is ongoing to investigate whether there should be new criteria established for secondary contact recreational uses.

There are 30 States that have communities with active CSO discharges. Of these, only twelve have adopted water quality criteria based on the indicators preferred by EPA. A summary of the standards for these twelve States is presented in Table 2. It should be noted that in several cases the existing State standard is less stringent than the EPA-recommended steady-state geometric mean, and for others, more stringent. Furthermore, the new standards were not anticipated by the CSO Policy, and therefore are not addressed by most existing LTCPs.

California, Connecticut, Indiana, New Jersey, Oregon, and Tennessee have essentially adopted EPA's criteria for at least some, if not all, of the designated uses. Some of the notable differences between the States' criteria, as compared to EPA's recommended criteria include:

- Vermont, where criteria are considerably more stringent;
- Maine, where the single sample maximum (SSM) criteria are less stringent for fresh water and all criteria for marine waters are more stringent;
- Tennessee, where there is no SSM requirement for *E. coli*;
- Michigan, where the criteria are less stringent for beach areas; and
- New Jersey, where all water bodies must meet the SSM for beaches.

Table 2 – Summary of Bacteria Criteria in States with CSO Communities that have Enterococci and/or *E.coli* Standards

STATES	WATER QUALITY CRITERIA (counts of enterococci, unless noted)	COMMENTS
California	Marine Waters: Geometric mean (GM) =35 cfu/100 mL Single sample maximum (SSM) range from 104-500 cfu/100mL Fresh Waters: GM =33 cfu/100 mL SSM range from 61-151 cfu/100mL GM =126 cfu/100 mL (<i>E. coli</i>) SSM range from 235-576 cfu/100mL (<i>E. coli</i>)	Three of California's nine Regional Boards have adopted criteria based on EPA's recommended indicators. The other six Boards have not.
Connecticut	Inland, coastal, and marine waters: GM = 33cfu/100 mL SSM = 61cfu/100 mL	Enterococci criteria established only for bathing waters; total fecal standards for secondary contact.
Delaware	Fresh Waters: GM = 100 cfu/100 mL Marine Waters: GM = 100 cfu/100 mL	
Indiana	Total Body Contact Recreation: GM = 125 cfu/100 mL (<i>E. coli</i>) SSM = 235 cfu/100 mL (<i>E. coli</i>)	Seasonal: April - October
Maine	Fresh Waters: Class B: GM = 64 cfu/100 mL (<i>E. coli</i>) SSM = 427 cfu/100 mL (<i>E. coli</i>) Class C: GM = 142 cfu/100 mL (<i>E. coli</i>) SSM = 949 cfu/100 mL (<i>E. coli</i>) Marine Waters: Class SB: GM = 8 cfu/100 mL SSM = 54 cfu/100 mL Class SC: GM=14 cfu/100 mL SSM = 94 cfu/100 mL	Seasonal for marine waters: May 15 - September 30
Michigan	All water bodies: GM = 130 cfu/100 mL (<i>E. coli</i>) SSM = 300 cfu/100 mL (<i>E. coli</i>)	All waters of the State protected for primary contact recreation May 1 – October 31

STATES	WATER QUALITY CRITERIA (counts of enterococci, unless noted)	COMMENTS
New Hampshire	Fresh Waters: Class A GM = 47 cfu/100mL (<i>E. coli</i>) SSM = 153 cfu/100 mL (<i>E. coli</i>) Class B GM = 120 cfu/100mL (<i>E. coli</i>) SSM = 406 cfu/100 mL (<i>E. coli</i>) Class B (beaches) GM = 47 cfu/100mL (<i>E. coli</i>) SSM = 88 cfu/100 mL (<i>E. coli</i>) Marine Waters: Class A: GM = 35 cfu/100 mL SSM = 104 cfu/100 mL “beaches” SSM = 88 cfu/100 mL Class B: GM = 35 cfu/100 mL SSM = 104 cfu/100 mL “beaches” SSM = 88 cfu/100 mL	Based on a minimum of 3 samples in a 60-day period. Class B WQS apply to CSOs measured at end-of-pipe.
New Jersey	Fresh Waters: GM = 33 cfu/100 mL SSM = 61 cfu/100 mL Marine Waters: GM = 35 cfu/100 mL SSM = 104/100 mL	
Ohio	Lake Erie & Ohio River: GM = 126 cfu/100 mL (<i>E. coli</i>) SSM* = 235 cfu/100 mL (<i>E. coli</i>) All Other State Waters: Primary contact: GM = 126 cfu/100 mL (<i>E. coli</i>) SSM* = 298 cfu/100 mL (<i>E. coli</i>) Secondary contact GM = 126 cfu/100 mL (<i>E. coli</i>) SSM = 576 cfu/100 mL (<i>E. coli</i>)	* SSM standard actually requires that no more than 10% of samples exceed criteria
Oregon	Fresh and Marine Waters: GM = 126 cfu/100 mL (<i>E. coli</i>) SSM = 406 cfu/100 mL (<i>E. coli</i>)	
Tennessee	Recreation waters: GM = 126 cfu/100 mL (<i>E. coli</i>)	
Vermont	Class A: SSM = 18 cfu/100 mL (<i>E. coli</i>) Class B: SSM = 77 cfu/100 mL (<i>E. coli</i>)	Standards may be waived October 31 - April 1.

OVERCOMING THE BARRIERS

The water quality based provisions of the CSO Policy are a key component in the development of a cost-effective strategy for CSO control. Unfortunately, they are often unpopular politically. Therefore CSO communities will have to work proactively to overcome many of the impediments to implementing the water quality based provisions of the CSO Policy. Such actions could include:

- Coordinating with permitting, WQS, and enforcement staffs in the respective jurisdictions;
- Communicating cost-benefit and affordability analyses to the stakeholder, including the public;
- Developing a phased implementation schedule for the LTCP, which allows for consideration of the incremental benefits of CSO abatement efforts; and,
- Educating elected officials and the public about the need for realistic water quality standards for CSO receiving waters.

CSO communities may also consider negotiating with the WQS authority about different ways to apply existing water quality standards. For example, many States apply the ambient water quality criteria for bacteria directly at the point of discharge (end-of-pipe) with no allowance for in-stream mixing. Alternative applications of existing criteria that provide a mixing zone often more accurately reflect the potential public health threat posed by the discharge. For example, applying the criteria at the point where recreation occurs, rather than at the end-of-pipe, would allow communities to take into account the in-stream dilution. This concept is particularly appropriate for communities where the CSO outfalls are sufficiently removed from recreational areas so as not to pose a public health threat.

Another possibility would be for CSO communities to petition their State to segment the CSO receiving water to more accurately reflect the actual designated uses. For example, current standards would be left in place to protect recreation in the areas where it is most likely to occur while precluding it in other areas of the receiving water where CSOs and other discharges pose significant public health threats.

CONCLUSIONS

With the FY1999 Congressional directive and the recent release of EPA's draft guidance on implementing the water quality-based provisions of the CSO Policy, WQS reviews for CSO receiving waters are acquiring heightened attention. As suggested by the guidance, the key to initiating the review of water quality standards is developing an effective means for coordination and communication. Involving the responsible parties at the local, state, and regional level early in the process will facilitate both WQS reviews and the development and implementation of a cost-effective LTCP that is protective of human health and the environment. It is never too early, or too late, to initiate contact with all parties and begin the process for reviewing WQS for CSO receiving waters. This effort must include public outreach to address the significant hurdles associated with designating uses.

As more and more CSO communities move to finalize their LTCPs, before the adoption of the new bacteria criteria, the importance of developing a flexible LTCP based on current standards will increase. CSO communities currently collecting receiving water quality data should work to include *E. coli* and enterococci in their analyses. These analyses will provide the dataset needed for revising the LTCP when the new bacteria standards become law, and will also serve as the basis for showing progress when conducting post-compliance monitoring.

REFERENCES

- a. EPA, Office of Water. *DRAFT Guidance for Implementing the Water Quality Based Provisions of the CSO Control Policy*. May 2000.
- b. EPA, Office of Water. *DRAFT Implementation Guidance for Ambient Water Quality Criteria for Bacteria -- 1986*. February 2000.